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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,125	02/27/2002	Izhak Baharav	10010314-1	2242

7590 06/28/2004
AGILENT TECHNOLOGIES, INC.
Legal Department, DL429
Intellectual Property Administration
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EXAMINER

YAM, STEPHEN K

ART UNIT	PAPER NUMBER
2878	

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/086,125

Applicant(s)

BAHARAV ET AL.

Examiner

Stephen Yam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 11-19, 27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-19, 27 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 0404.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This action is in response to the appeal brief filed on April 6, 2004. Claims 1-9, 11-19, 27, and 28 are currently pending.

Response to Arguments

1. In view of the appeal brief filed on April 6, 2004, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

- (1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,
- (2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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3. Claim 1-3, 7-9, 12, 14, 15, and 17-19 rejected under 35 U.S.C. 102(b) as being anticipated by Tabei US Patent No. 4,404,586.

Regarding Claim 1, Tabei teaches (see Fig. 2) a digital image sensor, comprising a first (4, 5, 26) two-color photo-detector sensitive to a first total wavelength range (blue+red), said first two-color photo-detector having a first photo-detector element (26) capable of absorbing light within a first range of wavelengths (blue) of said first total wavelength range and a second photo-detector element (5) capable of absorbing light within a second range of wavelengths (red) of said first total wavelength range, said first photo-detector element being in an elevated relation with said second photo-detector element (see Fig. 2), said first photo-detector element being electrically isolated (41) from said second photo-detector element (see Fig. 5 and Col. 7, lines 64-68), and a second two-color photo-detector (27, 34) having a third photo-detector element (27) in an elevated relation with a fourth photo-detector element (34), said third photo-detector element being electrically isolated (41) from said fourth photo-detector element (see Fig. 5 and Col. 7, lines 64-68), said second two-color photo-detector being sensitive to a second total wavelength range (blue+green+red) different from said first total wavelength range.

Regarding Claims 2 and 15, Tabei teaches (see Fig. 2) a substrate (2), said second photo-detector element being formed within said substrate (see Fig. 5).

Regarding Claim 3, Tabei teaches (see Fig. 5) a dielectric layer (41) between said first photo-detector element and said second photo-detector element, said dielectric layer electrically isolating said first photo-detector element from said second photo-detector element (see Col. 7, lines 64-68).

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Regarding Claims 7 and 17, Tabei teaches (see Fig. 4) a color filter (4) (see Col. 6, lines 4-5) in an elevated relation with said first photo-detector element, said color filter absorbing light within a third range of wavelengths and passing light within said first and second ranges of wavelengths (see Fig. 5a-5c).

Regarding Claims 8 and 18, Tabei teaches (see Fig. 5) a transparent metal conductor layer (37) between said color filter and said first photo-detector element (see Col. 8, lines 1-3).

Regarding Claims 9 and 19, Tabei teaches (see Fig. 2) circuitry (6, 9) for driving said first photo-detector element and said second photo-detector element (see Col. 4, lines 56-60), said first photo-detector element being in an elevated relation with said circuitry (see Fig. 2).

Regarding Claim 12, Tabei teaches said third photo-detector element capable of accumulating charge upon reception of light within a third range of wavelengths (blue) and said fourth photo-detector element is capable of accumulating charge upon reception of light within a fourth range of wavelengths (red+green) (see Fig. 2 and Col. 6, lines 4-25).

Regarding Claim 14, Tabei teaches (see Fig. 2 and 5) a digital image sensor comprising a first two-color photo-detector (4, 5, 26) sensitive to a first total wavelength range (blue+red), said first two-color photo-detector having a first photo-detector element (26) capable of absorbing light within a first range of wavelengths (blue) of said first total wavelength range and a second photo-detector element (5) capable of absorbing light within a second range of wavelengths (red) of said first total wavelength range, said first photo-detector element being in an elevated relation with said second photo-detector element (see Fig. 2), a first dielectric layer (portion of (41) between (5) and (3)) (see Fig. 5) between said first photo-detector element and said second photo-detector element, a second two-color photo-detector (27, 34) having a third

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photo-detector element (27) in an elevated relation (see Fig. 2) with a fourth photo-detector element (34), said second two-color photo-detector being sensitive to a second total wavelength range (blue+green+red) different from said first total wavelength range, and a second dielectric layer (portion of (41) between (34) and (3)) (see Fig. 5) between said third photo-detector element and said fourth photo-detector element.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabei.

Regarding Claim 13, Tabei teaches the sensor in Claim 12, according to the appropriate paragraph above. Tabei also teaches the first, second, third, and fourth photo-detector elements generating first, second, third, and fourth color values, respectively (see Col. 9, lines 38-50).

Tabei does not teach a third and fourth two-color photo-detector having the same wavelength sensitivities as the first two-color photo-detector. It is well known in the art to use multiple photo-detectors in an array to detect an optical image or pattern. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include two additional structures of Tabei placed adjacent to each other, each photo-detector element producing

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different color values, in the sensor of Tabei, to capture a colored visual image or multi-dimensional pattern by using multiple adjacent detectors in an array.

6. Claims 4-6, 16, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tabei in view of Nozaki et al. US Patent No. 4,677,289.

Regarding Claims 4, 16, 27, and 28, Tabei teaches the sensor in Claims 1 and 14, according to the appropriate paragraph above. Tabei does not teach said first photo-detector element is formed of amorphous silicon having a first thickness selected to absorb light within said first range of wavelengths and said third photo-detector element is formed of amorphous silicon having a second thickness selected to absorb light within a third range of wavelengths. Nozaki et al. teach (see Fig. 4) a similar sensor, with a photo-detector element (42B) formed of amorphous silicon (see Col. 9, lines 7-9) having a thickness selected to absorb light within a desired range of wavelengths (see Col. 9, lines 61-66). It would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the first and third photo-detector elements from amorphous silicon and select a first and second thickness in order to absorb the first and second range of wavelengths, as taught by Nozaki et al., in the sensor of Tabei, to use standard semiconductor construction techniques and materials to produce the sensor, to lower production costs while providing excellent performance.

Regarding Claims 5 and 6, Tabei teaches the sensor in Claim 1, according to the appropriate paragraph above. Tabei also teaches the second photo-detector element as a photodiode (see Col. 5, lines 49-51). Tabei does not teach the first and second photo-detector elements as PIN photodiodes. Nozaki et al. teach (see Fig. 4) a similar sensor, with a first photo-

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detector element (42B) in elevated relation to a second photo-detector element (42G), wherein the first and second photodetector elements are PIN photodiodes (see Col. 9, lines 7-9). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use PIN photodiodes for the first and second photodetector elements, as taught by Nozaki et al. in the sensor of Tabei, to utilize common photodetector layering while providing respectable detection performance and sensitivity.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tabei in view of Hayward et al. US Patent No. 4,214,264.

Regarding Claim 11, Tabei teaches the sensor in Claim 1, according to the appropriate paragraph above. Tabei also teaches (see Fig. 4) a first color filter (4) (see Col. 6, lines 4-5) in an elevated relation with said first photo-detector element, said color filter absorbing light within a third range of wavelengths and passing light within said first and second ranges of wavelengths (see Fig. 5a-5c). Tabei does not teach a second color filter in an elevated relation with said third photo-detector element, said second color filter absorbing light within either said first or second ranges of wavelengths and passing light within said third range of wavelengths and passing light within either said first or second ranges of wavelengths not absorbed by said second color filter. Hayward et al. teach a similar device, with a first color filter (cyan) in an elevated relation with a first photo-detector element (S_3) of a first two-color photo-detector (S_3 , S_4) absorbing light within a third range of wavelengths ($>600\text{nm}$) (see Fig. 6d) and passing light within said first and second ranges of wavelengths (see Fig. 6a and 6b), and a second color filter (yellow) in an elevated relation with a third photo-detector element (S_1) of a second two-color photo-detector

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(S₁, S₂) absorbing light within either said first or second ranges of wavelengths(see Fig. 6a vs. 6c), passing light within said third range of wavelengths (see Fig. 6c), and passing light within either said first or second ranges of wavelengths not absorbed by said second color filter (see Fig. 6b vs. 6c). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a second color filter in an elevated relation with said third photo-detector element, absorbing light within either said first or second ranges of wavelengths and passing light within said third range of wavelengths and passing light within either said first or second ranges of wavelengths not absorbed by said second color filter, as taught by Hayward et al., in the sensor of Tabei, to provide increased separation of color components for improved color sensitivity.

Response to Arguments

8. Applicant's arguments filed April 6, 2004 have been fully considered but they are not persuasive.

9. Applicant's arguments with respect to claims 1-9, 11-19, 27, and 28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Cao et al. US Patent No. 6,111,300 (US-filed application for publication EP 1006585A1 submitted in Applicant's IDS) teaches a sensor with photo-detector elements located in an elevated position with each other.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Yam whose telephone number is (571)272-2449. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571)272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SY


THANH X. LUU
PATENT EXAMINER